INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad-500043

Department of INFORMATION TECHNOLOGY

TUTORIAL QUESTION BANK

Course Name	:	**FUNDAMENTALS OF ELECTRICAL AND ELECTRONICS ENGINEERING**
Course Code	:	AEE001
Class	:	**B. Tech II Semester**
Branch	:	**INFORMATION TECHNOLOGY**
Year	:	**2017 – 2018**
Course Coordinator	:	Mr. K Lingaswamy Reddy, Assistant Professor, EEE
Course Faculty	:	Dr. V Chandra Jagan Mohan, Professor, EEE Mr. A Naresh Kumar, Assistant Professor, EEE

COURSE OBJECTIVES:
The course should enable the students to:

I	Gain knowledge in fundamental laws such as Ohm's law, Kirchhoff's laws, and able to solve simple Problems.
II	Be familiar with the basic fundamentals of Electric Circuits, net work theorems and the Mathematical tools used to represent and analyze Electrical circuit.
III	Be familiar with Introduction to RLC circuits, Introduction to three phase supply of the AC circuits.
IV	Illustrate the V-I characteristics of various diodes and bi-polar junction transistor.

COURSE LEARNING OUTCOMES:
Students, who complete the course, will have demonstrated the ability to do the following:

CAEE001.01	Understand the concept of circuit, classification of elements and types of energy sources.
CAEE001.02	State different laws associated with electrical circuits and apply source transformation technique to determine equivalent resistance and source current
CAEE001.03	Explain Energy due to mutual induction and constraint on mutual inductance.
CAEE001.04	Define the various nomenclature related with network topology and give the importance of dual network.
CAEE001.05	Prove the law of conservation of energy, superposition principle, reciprocity and maximum power transfer condition for the electrical network with DC excitations.
CAEE001.06	Summarize the procedure of thevenin's, norton's and milliman's theorems to reduce complex network into simple equivalent network.
CAEE001.07	Explain the steps of compensation, zero current and voltage shift theorem to predict Constraints of electrical networks.
CAEE001.08	Analyze the steady state behavior of series and parallel RL, RC and RLC circuit with sinusoidal excitation.
CAEE001.09	Identify the alternating quantities with it instantaneous, average and root mean square values.
CAEE001.10	Explain balance and unbalanced three phase circuits.
CAEE018.11	Compare the operation of half wave, full wave and bridge rectifiers.

CAEE018.12	Differentiate the operation and biasing of semiconductor devices like diodes and transistor.
CAEE018.13	Apply the concept of diodes in converting AC to DC and can give the application of the rectifier circuit.
CAEE018.14	Distinguish between the different configurations of transistors and the applications depending on their characteristics.
CAEE018.15	Examine the voltage, current and frequency of electric network using CRO.
CAEE018.16	Apply the network reduction techniques, concept of graph theory, magnetic circuits, RLC circuits, AC signal measurement, three phase circuits and characteristics of PN junction diode and transistor.
CAEE018.17	Process the knowledge and skills for employability and to succeed national and international level competitive examinations.

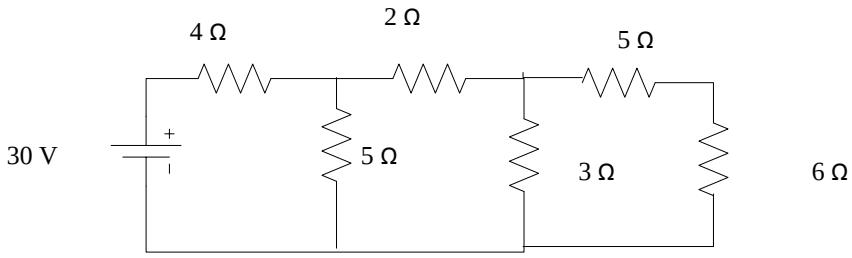
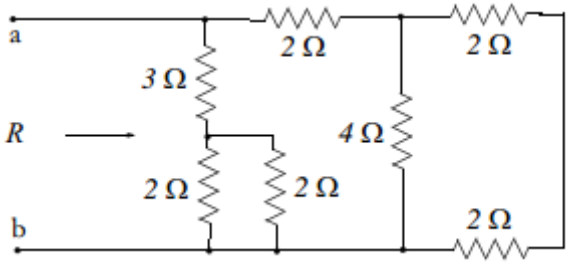
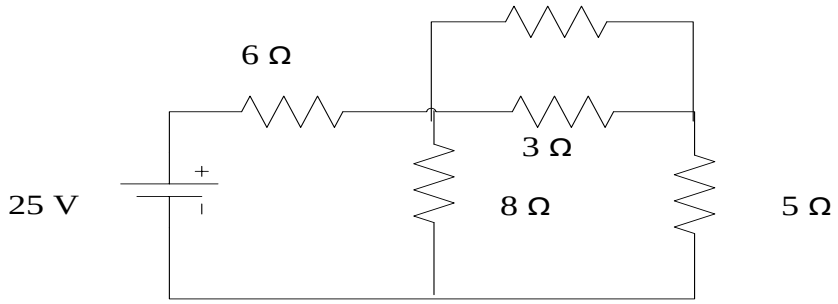
UNIT – I

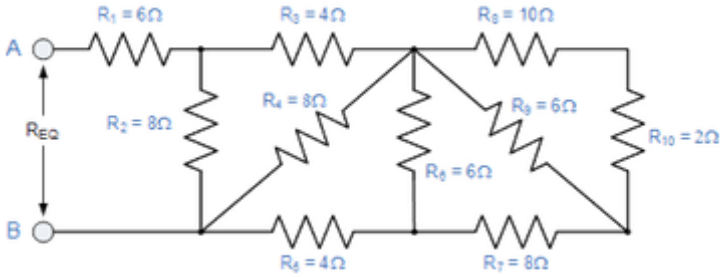
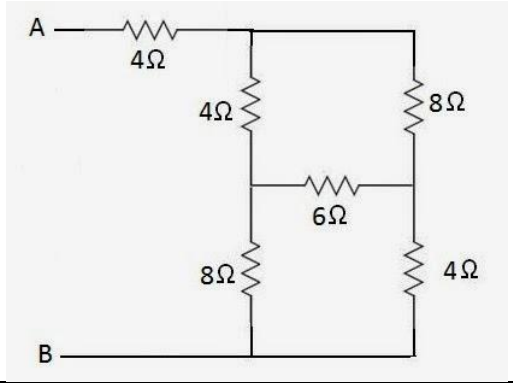
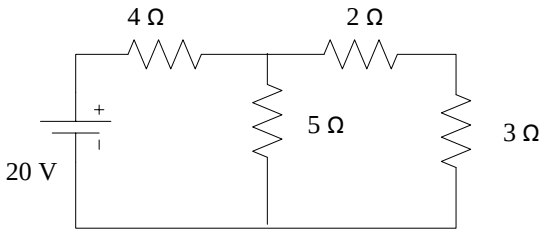
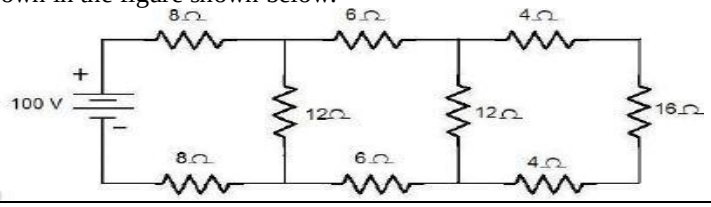
ELECTRIC CIRCUITS, ELECTROMAGNETISM AND INSTRUMENTS

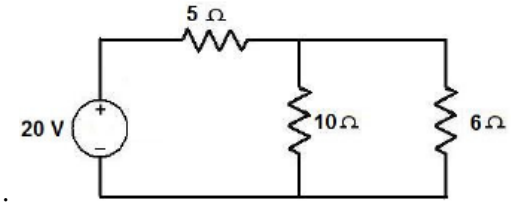
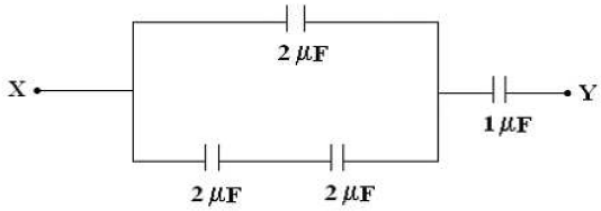
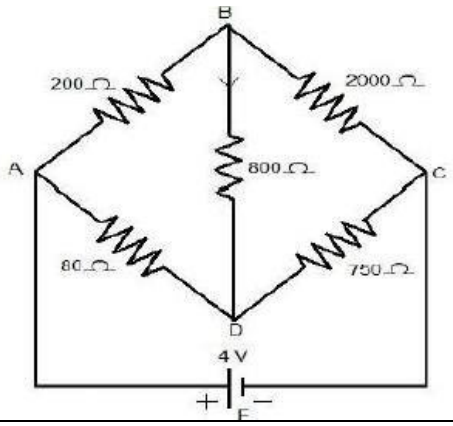
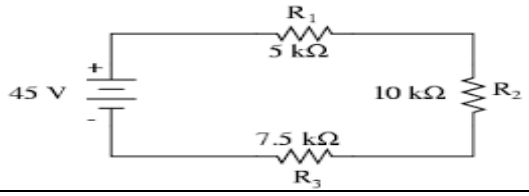
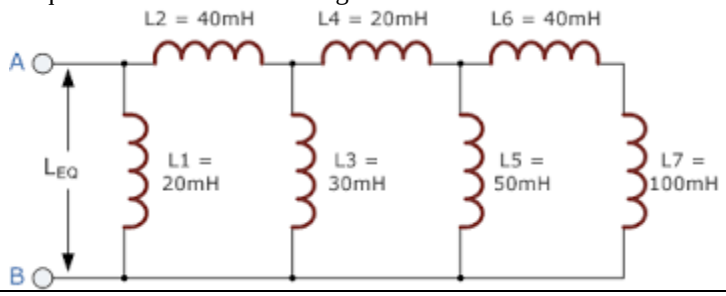
Part - A(Short Answer Questions)

S No	QUESTION	Blooms taxonomy level	Course Learning Outcomes
1	Define potential difference.	Remember	CAEE001.01
2	Define current.	Remember	CAEE001.01
3	Define resistance.	Remember	CAEE001.01
4	Give the expression for voltage in terms of W and Q.	Understand	CAEE001.01
5	Give the charge of an electron.	Understand	CAEE001.01
6	State OHM's law.	Remember	CAEE001.01
7	State Kirchhoff's current and Kirchhoff's voltage laws.	Remember	CAEE001.02
8	Define the power and energy.	Remember	CAEE001.01
9	Describe active elements.	Remember	CAEE001.01
10	Describe passive elements.	Remember	CAEE001.01
11	Calculate the equivalent resistance of the circuit if applied voltage is 30V and current flowing through circuit is 6A, receiving a power of 75W.	Understand	CAEE001.01
12	If the charge developed between two plates is 5C and capacitance is 6.5 F, calculate the voltage across the plates.	Understand	CAEE001.01
13	If three capacitors are connected in series which are 3F, 6.2F and 8F calculate equivalent capacitance.	Understand	CAEE001.01
14	If the three inductors are in parallel with 10mH, 20mH and 30mH, calculate the equivalent inductance.	Understand	CAEE001.01
15	Define the inductance.	Remember	CAEE001.01
16	Define the capacitance.	Remember	CAEE001.01
17	Draw the symbols of different controlled sources.	Remember	CAEE001.01
18	State superposition principle.	Remember	CAEE001.01
19	Define circuit representing its parts.	Remember	CAEE001.01
20	Define mutual inductance.	Remember	CAEE001.03
21	Describe the concept of mutual inductance and derive the equation for energy stored in mutual inductor.	Remember	CAEE001.03
22	Calculate the equivalent resistance of the circuit if R_1=10 OHMS, R_2=20 OHMS, R_3=30 OHMS are in series.	Understand	CAEE001.01
23	Calculate the equivalent resistance of the circuit if R_1=10 OHMS, R_2=20 OHMS, R_3=30 OHMS are in parallel.	Understand	CAEE001.01

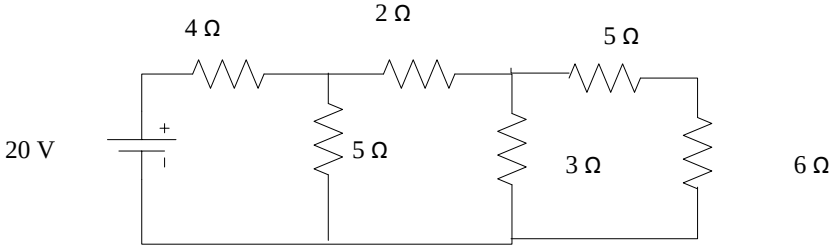
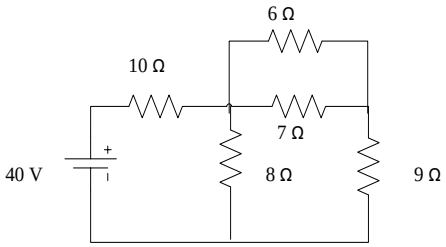
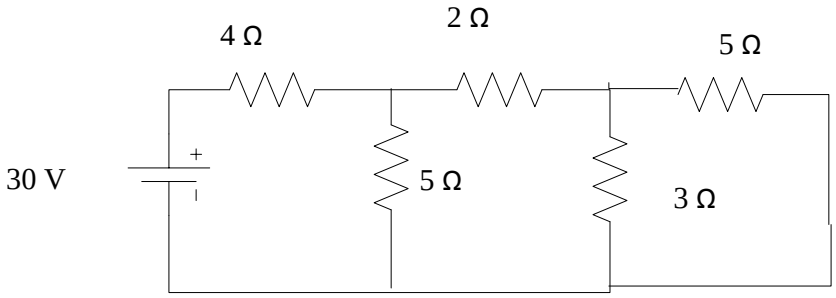
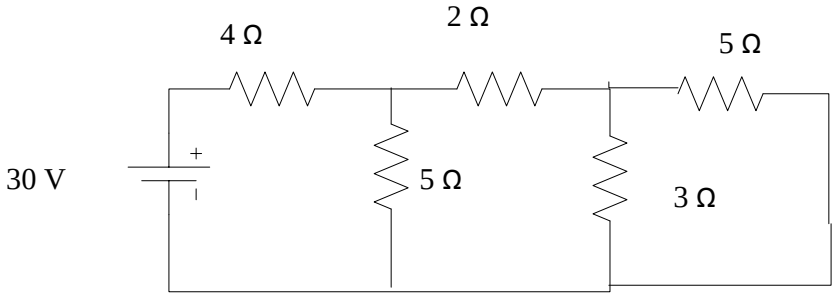
Part - B (Long Answer Questions)

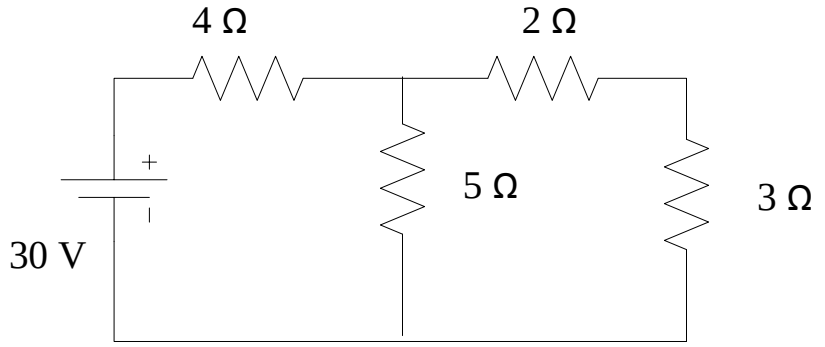
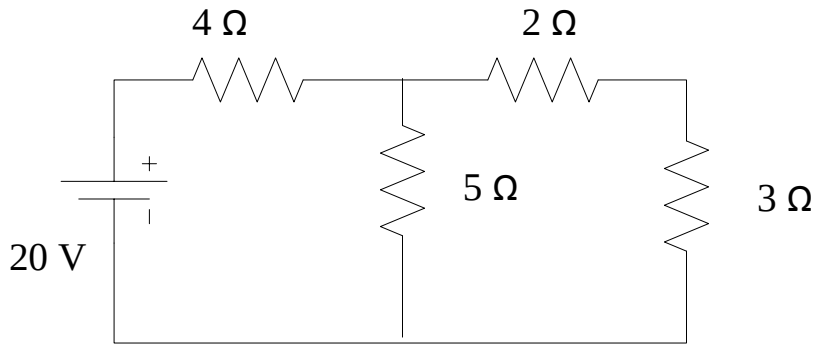
1	Write short notes on voltage-current relations in RLC parameters.	Remember	CAEE001.01
3	Explain the Kirchhoff's laws with example and neat diagrams.	Understand	CAEE001.02
4	Classify types of elements and explain in detail.	Understand	CAEE001.01
5	Distinguish between ideal and practical energy sources.	Understand	CAEE001.01
6	State Ohm's law and give its applicability to electrical network. Explain convention current direction and voltage across an element.	Remember	CAEE001.01
7	Write the conventions to study any electrical circuit.	Remember	CAEE001.01
8	Define the terms voltage, current, power, energy, node and degree of the node.	Remember	CAEE001.01
9	State voltage and current division rules and explain with neat example.	Remember	CAEE001.02
10	Derive the V-I relationship, power and energy stored in inductor.	Understand	CAEE001.02
11	Derive the V-I relationship, power and energy stored in capacitor.	Understand	CAEE001.02
12	Derive the equivalent resistance equations when they are connected in series and parallel.	Understand	CAEE001.02
13	Derive the equivalent inductance and capacitance equations when they are connected in series and parallel.	Understand	CAEE001.02
14	Derive the expressions for equivalent resistances while transforming from star to delta and delta to star.	Understand	CAEE001.02
Part - C (Problem Solving and Critical Thinking Questions)			
1	Calculate the equivalent resistance and source current for the given data. 	Understand	CAEE001.02
2	Calculate the equivalent resistance for the given circuit. 	Understand	CAEE001.02
3	Use network reduction technique and calculate current response in each element. 	Understand	CAEE001.02

4	In a circuit branch AB = 10 ohm, BC = 20 ohm , CD = 15 ohm ,BD = 8 ohm and DA = 5 ohm and an source of 100V in series with 5ohm connected across A and C. Calculate equivalent resistance, source current and voltage drop across DA.	Understand	CAEE001.02
5	In an circuit branch AB = 1 ohm , BC = 2 ohm , CD = 1 ohm ,BD = 8 ohm and DA = 5 ohm and an source of 100V in series with 5 ohm connected across A and C. Calculate equivalent resistance, source current and voltage drop across DA.	Understand	CAEE001.02
6	Calculate equivalent resistance 	Understand	CAEE001.02
7	Calculate the equivalent resistance between A and B terminals using star delta transformation. 	Understand	CAEE001.02
8	Calculate equivalent resistance, source current, voltage drop and power dissipated in each resistor. 	Understand	CAEE001.02
9	Calculate a) the equivalent resistances across the terminals of the supply, b) total current supplied by the source and c) power delivered to 16 ohm resistor in the circuit shown in the figure shown below. 	Understand	CAEE001.02

10	Calculate the power consumed by each resistor.  	Understand	CAEE001.02
11	Calculate the equivalent capacitance of the combination shown figure below across X and Y.  	Understand	CAEE001.02
12	A capacitor having capacitance of 5μF is charged to a voltage of 10V. Calculate the stored energy in joules.	Understand	CAEE001.02
13	Determine the current through 800 ohm resistor in the network shown in figure.  	Understand	CAEE001.02
14	Calculate power across each element in the given circuit.  	Understand	CAEE001.02
15	Calculate equivalent inductance in the given circuit.  	Understand	CAEE001.02

16	In a network consisting three parallel branches, first across is defined as 20V in series with 5 ohms, second branch 7 ohms and third branch 10V in series with 4 ohms. Apply super-position theorem to Determine voltage drop across 7 ohms resistor.	Understand	CAEE001.02
UNIT - II			
NETWORK ANALYSIS AND THEOREMS			
Part – A (Short Answer Questions)			
1	Describe mesh	Remember	CAEE001.01
2	Write the limitations of mesh analysis.	Remember	CAEE001.02
3	Write the limitations of nodal analysis.	Remember	CAEE001.02
4	Describe node	Remember	CAEE001.02
5	Define network topology and write their applications	Understand	CAEE001.04
6	Define tree and co-tree.	Remember	CAEE001.04
7	Write the expression for number of links.	Understand	CAEE001.04
8	For 8 element 5 node graph, calculate number of links.	Understand	CAEE001.04
9	Write the importance of twigs.	Remember	CAEE001.04
10	State tellegen's theorem	Remember	CAEE001.06
11	State theveninn's theorem	Remember	CAEE001.05
12	State Norton's theorem	Remember	CAEE001.05
13	State voltage shift theorem	Remember	CAEE001.07
14	State reciprocity theorem	Remember	CAEE001.05
15	State compensation theorem	Remember	CAEE001.06
16	State Milliman's theorem	Remember	CAEE001.06
17	State zero current theorem	Remember	CAEE001.07
18	State maximum power transfer theorem	Remember	CAEE001.05
Part - B (Long Answer Questions)			
1	Explain mesh analysis with a neat example.	Remember	CAEE001.02
2	Explain nodal analysis with a neat example.	Remember	CAEE001.02
3	Define network topology and explain its importance in electrical networks?	Understand	CAEE001.04
4	Derive the relation between twig voltages and branch voltages and write current equations.	Understand	CAEE001.04
5	Define terms graph, tree and co-tree, branches and links, nodes and degree of the node.	Remember	CAEE001.04
6	State and prove tellegen's theorem with an example.	Remember	CAEE001.05
7	State and prove thevenin's theorem with an example.	Remember	CAEE001.06
8	State and prove Norton's theorem with an example.	Remember	CAEE001.05
9	State and prove super-position theorem with an example.	Remember	CAEE001.05
10	State and prove reciprocity theorem with an example	Remember	CAEE001.05
11	State and prove compensation theorem with an example.	Remember	CAEE001.07
12	State and prove voltage shift theorem with an example.	Remember	CAEE001.07
13	State and prove zero current theorem with an example.	Remember	CAEE001.07
15	State and prove maximum power transformer theorem. With an example.	Remember	CAEE001.07
16	Explain pushing a voltage source through a node with an example.	Remember	CAEE001.07

17	Explain splitting a current source in the circuit with an example.	Remember	CAEE001.07
Part - C (Problem Solving and Critical Thinking Questions)			
1	 Apply mesh analysis and calculate the current above through each element.	Remember	CAEE001.05
2	Calculate the node voltages and the power absorbed by 7 ohms resistor. 	Understand	CAEE001.05
3	 Calculate the mesh currents for the given circuit along with voltage across andpower consumed by 3 ohms resistor.	Understand	CAEE001.05
4	 Calculate the node voltages for the given circuit and current flowing through 3 ohms resistors.	Understand	CAEE001.05
5	In an circuit branch AB = 11 OHMS, BC = 20 OHMS, CD = 12 OHMS, BD = 8 ohms and DA = 15 OHMS and an source of 100V in series with 5OHMS connected across A and C. Calculate the mesh currents.	Remember	CAEE001.05
6	In an circuit branch AB = 1 OHMS, BC = 2 OHMS, CD = 1 OHMS , BD = 8 ohms and DA = 5 OHMS and an source of 100V in series with 5 OHMS connected across A and C. Calculate equivalent resistance, source Current and voltage drop across DA.	Understand	CAEE001.05

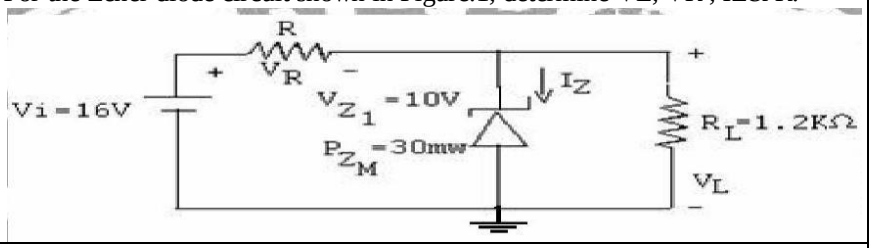
<table>
<tr><td>7</td><td>Calculate the current flowing through 3 ohms resistor using thevenin’s theorem. If the circuit is as below.
 
</td><td>Remember</td><td>CAEE001.06</td></tr>
<tr><td>8</td><td>Calculate the current flowing through 3 ohms resistor using Norton’s theorem. If the circuit is as below.
 
</td><td>Understand</td><td>CAEE001.06</td></tr>
<tr><td>9</td><td>Two parallel branches are connected across AB terminals , they 10V in series with 2 ohms and 20V in series with 5 ohms, use the necessary theorem and Calculate the power absorbed by load resistor with maximum power across AB</td><td>Understand</td><td>CAEE001.05</td></tr>
<tr><td>10</td><td>In a circuit branch AB = 10 OHMS, BC = 20 OHMS, CD = 15 OHMS, BD = 8 OHMS and DA = 5 OHMS and an source of 100V in series with 5OHMS connected across A and C. verify the tellegen’s theorem.</td><td>Understand</td><td>CAEE001.05</td></tr>
<tr><td>11</td><td>In a series circuits source resistance is 45 ohms and load resistor is R_L with 20V DC supply. If RL is variable of resistances 10, 20, 30, 40, 45, 50, 60, 70 ohms respectively. Calculate for what resistance of load maximum power is transferred, maximum power value, current and voltage drops in each case.</td><td>Understand</td><td>CAEE001.05</td></tr>
<tr><td>12</td><td>In a circuit branch AB = 5 OHMS, BC = 2 OHMS, CD = 6 OHMS, BD = 7 ohms and DA = 9 OHMS and an source of 100V in series with 5 OHMS connected across A and C. Calculate the mesh currents.</td><td>Understand</td><td>CAEE001.05</td></tr>
<tr><td>13</td><td><table>
<tr><th>Element</th><th>From node</th><th>To node</th></tr>
<tr><td>20 V source</td><td>a</td><td>0</td></tr>
<tr><td>4 ohms</td><td>a</td><td>b</td></tr>
<tr><td>5 ohms</td><td>b</td><td>0</td></tr>
<tr><td>2 ohms</td><td>b</td><td>c</td></tr>
<tr><td>3 ohms</td><td>c</td><td>0</td></tr>
<tr><td>5 ohms</td><td>c</td><td>d</td></tr>
<tr><td>6 ohms</td><td>d</td><td>0</td></tr>
</table>
Apply mesh analysis and calculate the current flowing through each element.</td><td>Remember</td><td>CAEE001.05</td></tr>
</table>

<table>
<tr><td>14</td><td>
<table>
<tr><td>Element</td><td>From node</td><td>To node</td></tr>
<tr><td>30 V source</td><td>a</td><td>0</td></tr>
<tr><td>4 ohms</td><td>a</td><td>b</td></tr>
<tr><td>5 ohms</td><td>b</td><td>0</td></tr>
<tr><td>2 ohms</td><td>b</td><td>c</td></tr>
<tr><td>3 ohms</td><td>c</td><td>0</td></tr>
<tr><td>5 ohms</td><td>c</td><td>d</td></tr>
<tr><td>6 ohms</td><td>d</td><td>0</td></tr>
</table>
Apply nodal analysis and calculate the current flowing through each element.
</td><td>Remember</td><td>CAEE001.05</td></tr>
<tr><td>15</td><td>
<table>
<tr><td>Element</td><td>From node</td><td>To node</td></tr>
<tr><td>40 V source</td><td>a</td><td>0</td></tr>
<tr><td>10 ohms</td><td>a</td><td>b</td></tr>
<tr><td>8 ohms</td><td>b</td><td>0</td></tr>
<tr><td>7 ohms</td><td>b</td><td>c</td></tr>
<tr><td>6 ohms</td><td>b</td><td>c</td></tr>
<tr><td>9 ohms</td><td>c</td><td>0</td></tr>
</table>
Calculate the node voltages and the power absorbed by 7 ohms resistor.
</td><td>Understand</td><td>CAEE001.05</td></tr>
<tr><td colspan="4">UNIT – III</td></tr>
<tr><td colspan="4">AC CIRCUITS</td></tr>
<tr><td colspan="4">Part – A (Short Answer Questions)</td></tr>
<tr><td>1</td><td>Describe the steady state condition.</td><td>Remember</td><td>CAEE001.08</td></tr>
<tr><td>2</td><td>Explain initial conditions in an R, L and C network.</td><td>Understand</td><td>CAEE001.08</td></tr>
<tr><td>3</td><td>Define the step response of circuit.</td><td>Understand</td><td>CAEE001.08</td></tr>
<tr><td>4</td><td>Write short notes on voltage, current relations in RLC parameters.</td><td>Remember</td><td>CAEE001.08</td></tr>
<tr><td>5</td><td>Explain the steady state analysis of series RL circuit.</td><td>Understand</td><td>CAEE001.08</td></tr>
<tr><td>6</td><td>Explain the steady state analysis of series RC circuit.</td><td>Understand</td><td>CAEE001.08</td></tr>
<tr><td>7</td><td>Explain the steady state analysis of series RLC circuit.</td><td>Understand</td><td>CAEE001.08</td></tr>
<tr><td>8</td><td>Define the alternating quantity.</td><td>Remember</td><td>CAEE001.08</td></tr>
<tr><td>9</td><td>Give the alternating current and voltage in terms of sine function.</td><td>Remember</td><td>CAEE001.09</td></tr>
<tr><td>10</td><td>Define reactance</td><td>Remember</td><td>CAEE001.08</td></tr>
<tr><td>11</td><td>Define impedance</td><td>Remember</td><td>CAEE001.09</td></tr>
<tr><td>12</td><td>Define admittance</td><td>Remember</td><td>CAEE001.09</td></tr>
<tr><td>13</td><td>Define the power factor of the circuit and give its importance.</td><td>Understand</td><td>CAEE001.09</td></tr>
<tr><td>14</td><td>Define the peak, peak to peak, average, RMS value also peak and form factor of sine function.</td><td>Understand</td><td>CAEE001.09</td></tr>
<tr><td>15</td><td>Describe apparent power.</td><td>Understand</td><td>CAEE001.09</td></tr>
<tr><td>16</td><td>Describe active power.</td><td>Understand</td><td>CAEE001.09</td></tr>
<tr><td>17</td><td>Describe reactive power.</td><td>Understand</td><td>CAEE001.09</td></tr>
<tr><td colspan="4"></td></tr>
<tr><td>18</td><td>List the advantages of a poly phase system over a single phase system</td><td>Remember</td><td>CAEE001.10</td></tr>
<tr><td>19</td><td>Write the formula for power factor in two wattmeter method</td><td>Understand</td><td>CAEE001.10</td></tr>
<tr><td>20</td><td>Write the balanced voltage equations in sine function.</td><td>Understand</td><td>CAEE001.10</td></tr>
<tr><td>21</td><td>Describe the importance of two watt meter method.</td><td>Understand</td><td>CAEE001.10</td></tr>
<tr><td>22</td><td>List the applications of star connected three phase supply.</td><td>Remember</td><td>CAEE001.10</td></tr>
<tr><td>23</td><td>List the applications of delta connected three phase supply.</td><td>Remember</td><td>CAEE001.10</td></tr>
<tr><td>24</td><td>Draw the power triangle.</td><td>Remember</td><td>CAEE001.10</td></tr>
</table>

25	Define time constant.	Understand	CAEE001.10
Part – B (Long Answer Questions)			
1	Give the steady state response of series RL circuit with step input.	Remember	CAEE001.08
2	Give the steady state response of series RC circuit with step input.	Understand	CAEE001.08
3	Give the steady state response of series RLC circuit with step input.	Remember	CAEE001.08
4	Give the steady state response of parallel RL circuit with step input.	Remember	CAEE001.08
5	Give the steady state response of parallel RC circuit with step input.	Understand	CAEE001.08
6	Give the steady state response of parallel RLC circuit with step input.	Remember	CAEE001.08
7	Give the steady state response of series RL circuit with sinusoidal input.	Understand	CAEE001.08
8	Give the steady state response of series RC circuit with sinusoidal input.	Understand	CAEE001.08
9	Give the steady state response of series RLC circuit with sinusoidal input.	Understand	CAEE001.08
10	Give the steady state response of parallel RL circuit with sinusoidal input.	Understand	CAEE001.08
11	Give the steady state response of parallel RC circuit with sinusoidal input.	Understand	CAEE001.08
12	Give the steady state response of parallel RLC circuit with sinusoidal input.	Understand	CAEE001.08
13	Explain complex, apparent ,active and reactive power with power triangle	Understand	CAEE001.09
9	Derive the three phase voltage equations of star in terms of delta voltages.	Understand	CAEE001.10
10	Derive the three phase voltage equations of delta in terms of star voltages.	Understand	CAEE001.10
11	Explain balanced and unbalanced load for three phase circuits.	Remember	CAEE001.10
12	Derive the expressions for wattmeter readings in two wattmeter method with balanced star connected load.	Remember	CAEE001.10
13	Explain how reactive power can be measured in three phase circuits.	Understand	CAEE001.10
Part - C (Problem Solving and Critical Thinking Questions)			
1	A dc voltage of 20V is applied in a RL circuit where R = 5 and L = 10H. Calculate The time constant and The maximum value of stored energy.	Understand	CAEE001.08
2	A series circuit consisting of a 10Ω resistor, a 100μF capacitor and a 10 mH inductor is driven by a 50 Hz a.c. voltage source of maximum value 100 volts. Calculate the equivalent Impedance, current in the circuit, the power factor and power dissipated in the circuit.	Understand	CAEE001.09
3	A voltage $e = 200\sin 100\sin \pi t$ is applied to load having R=200 Ω series with L=638mH 1)Expression for current i= $I_m \sin(wt \pm \phi)$ 2)Power consumed by the load 3)reactive power of the load 4)voltage across R and L	Remember	CAEE001.08
4	A resistance of 120 Ω and a capacitance reactance of 250 Ω are connected in series across a AC voltage source. If a current of 0.9A is following in the circuit find out I) power factor II) supply voltage III) voltage across resistance and capacitance IV) active power and reactive power.	Remember	CAEE001.08
5	If R=25 Ω, L = 64mH, C=80μF are connected in series with 110V and find current and V_R, V_L, VC.	Understand	CAEE001.08
6	A 50 Ω resistor is connected in parallel with an inductance reactance of 30 Ω A 20V signal is applied to the circuit find the total impedance.	Understand	CAEE001.08
7	Determine the impedance and phase angle if R=50 Ω , C=100μf connected in parallel with voltage 100V and frequency 50Hz.	Understand	CAEE001.08
8	A Three phase 4 wire 100 V (L-L) system supplied a balanced Y connected load having impedances of $10\angle 30^o\Omega$ in each phase. Calculate line currents and draw the phasor diagram. How much current is flowing through the neutral	Understand	CAEE018.09

9	A Δ connected load has resistance (5 Ω) in each phase. If a balanced 3 phase 400 V supply is applied between lines, Calculate the phase currents and line currents and draw the phasor diagram.	Understand	CAEE018.09
10	A 3 phase, star connected system with 400 V (L-L) is connected to three loads: $25\angle 0^{o}$, $11\angle 20^{o}$ and $6\angle 30^{o}$ ohm (also connected in star). Calculate the line current, power and the current in the neutral of the system.	Remember	CAEE018.08
11	A three phase Y connected load has an inductor of 500 mH and capacitance of 100 μF in each phase. The load is connected across a 100V, 50Hz three phase balanced system Calculate the line currents for the load.	Understand	CAEE018.08
12	The power in a three phase circuits is measured by two wattmeters. If the total power is 50kW, power factor being 0.8 leading, what will be the reading of each wattmeter? For what pf. Will one of the wattmeter's read zero?	Remember	CAEE018.08
13	A balanced Y connected 3 phase load has an impedance of Zph = 5- j4 ohms in each phase. Calculate the line currents if a balanced 3 ph source of 100 V are applied across it. Draw the phasor diagram	Remember	CAEE018.08
14	If the voltage applied is 50V with 45 degrees and current flowing through circuit is 15A with 15 degrees, calculate complex power and circuit constants.	Understand	
UNIT-IV			
SEMICONDUCTOR DIODE AND APPLICATIONS			
Part – A (Short Answer Questions)			
1	Define semiconductor.	Remember	CAEE001.11
2	Explain forward bias of diode	Understand	CAEE001.11
3	Explain reverse bias of diode	Understand	CAEE001.11
4	Write the Applications of diode	Understand	CAEE001.11
5	Draw the V-I characteristics of diode	Remember	CAEE001.11
6	Differentiate intrinsic and extrinsic semiconductors.	Remember	CAEE001.11
7	Explain avalanche breakdown.	Understand	CAEE001.11
8	Draw the characteristics of zener diode	Remember	CAEE001.11
9	Discuss the importance of cut in voltage.	Remember	CAEE001.11
10	Define transformer utility factor.	Remember	CAEE001.11
11	Explain majority and minority carriers in a semiconductor.	Understand	CAEE001.11
12	Define efficiency.	Remember	CAEE001.13
13	Define form factor.	Remember	CAEE001.13
14	Define peak inverse voltage.	Remember	CAEE001.13
15	Define ripple factor.	Remember	CAEE001.13
16	Write the equation of diode current.	Understand	CAEE001.11
17	Define rectifier.	Remember	CAEE001.13
18	Define regulator.	Remember	CAEE001.13
Part – B (Long Answer Questions)			
1	Explain the theory of PN junction in semiconductors and explain how it acts as diode.	Understand	CAEE001.11
2	Explain the operation of PN junction diode in forward bias and reverse bias.	Understand	CAEE001.11
3	Explain how zener diode is used as voltage regulator.	Understand	CAEE001.11
4	Describe the diode current equation.	Remember	CAEE001.11
5	Analyze the effect of temperature on the volt –ampere characteristics of a diode.	Understand	CAEE001.11

6	Define rectifier. Describe average and RMS values for output voltage in half wave rectifier.	Remember	CAEE001.13
6	Describe average and RMS values for output voltage in centre tapped full wave rectifier.	Remember	CAEE001.13
7	Explain how diode acts as switch.	Understand	CAEE001.11
8	Explain zener and avalanche breakdown mechanisms in detail.	Understand	CAEE001.11
9	Explain the relative merits and demerits of all the rectifiers.	Understand	CAEE001.11
10	Describe potential energy barrier of the p-n junction? How does it arise and what is its order of magnitude.	Remember	CAEE001.11
11	Sketch the V-I characteristics of p-n junction diode for forward bias voltages. Analyze between the incremental resistance and the apparent resistance of the diode.	Understand	CAEE001.11
12	Explain the V-I characteristics of Zener diode and Analyze between avalanche and zener break downs.	Understand	CAEE001.11
13	Explain in detail, the variation of following semiconductor parameters with temperature, i) Energy gap ii) Conductivity.	Understand	CAEE001.11
14	List out the merits and demerits of Bridge type Full Wave rectifiers over centre tapped type Full Wave rectifiers.	Understand	CAEE001.13
15	Explain the working of centre-tapped full wave rectifier with suitable diagrams. Derive expressions for V_{DC}, I_{DC}, V_{rms} and I_{rms}.	Understand	CAEE001.13
Part - C (Problem Solving and Critical Thinking Questions)			
1	A full wave bridge rectifier having load resistance of 100Ω is fed with 220V, 50Hz through a step-down transformer of turn's ratio 11:1. Assuming the diodes ideal, calculate i) DC output voltage ii) Peak inverse voltage iii) Rectifier efficiency.	Remember	CAEE001.11
2	A 230 V, 60Hz voltage is applied to the primary of a 5:1 step down, center tapped transformer used in a full wave rectifier having a load of 900Ω. If the diode resistance and the secondary coil resistance together have a resistance of 100 Ω, calculate i) DC voltage across the load. ii)DC current flowing through the load. iii) DC power delivered to the load. v) PIV across each diode.	Remember	CAEE001.11
3	Calculate the values of forward current in the case of PN junction diode, with I_0=10μA V_f = 0.8V at T=300^{0}K Assume Si diode.	Understand	CAEE001.11
4	A HWR circuit supplies 100mA DC current to a 250Ω load. Calculate the DC output voltage, PIV rating of a diode and the r.m.s. voltage for the transformer supplying the rectifier.	Understand	CAEE001.11
5	A full wave rectifier circuit uses two silicon diodes with a forward resistance of 20Ω each. A DC voltmeter connected across the load of 1KΩ reads 55.4 volts. Calculate i) I_{rms} ii) Average voltage across each diode iii) ripple factor iv) Transformer secondary voltage rating.	Understand	CAEE001.11
6	A bridge rectifier uses four identical diodes having forward resistance of 5Ω each. Transformer secondary resistance is 5Ω and the secondary voltage of 30V (rms). Calculate the dc output voltage for IDC=200mA and the value of the ripple voltage.	Understand	CAEE001.11
7	In a Zener diode regulator, the supply voltage = 300V, Vz= 220V, Iz= 15mA and load current = 25mA. Calculate the value of resistor required to be connected in series with the Zener diode.	Remember	CAEE001.11
8	Calculate the value of D.C. resistance and A.C resistance of a Germanium junction diode at 25^{0}C with reverse saturation current, I_o= 25μA and at an applied voltage of 0.2V across the diode.	Understand	CAEE001.11
9	The reverse saturation current of a silicon p –n junction diode at an operating temperature of 27^{0}C is 50A. Calculate the dynamic forward and reverse resistances of the diode for applied voltages of 0.8 V and -0.4 V respectively.	Understand	CAEE001.11

10	For the Zener diode circuit shown in Figure.1, determine VL, VR , IZ& R. 	Understand	CAEE001.11
11	In a Zener diode regulator, the supply voltage = 300V, Vz = 220V, Iz = 15mA and load current = 25mA. Determine the value of resistor required to be connected in series with the Zener diode.	Understand	CAEE001.11
12	With a neat circuit diagram and waveforms explain the working of full wave bridge rectifier and show that its ripple factor is 0.48.	Understand	CAEE001.11
UNIT-V			
BIPOLAR JUNCTION TRANSISTOR AND APPLICATIONS			
Part - A (Short Answer Questions)			
1	Define transistor.	Remember	CAEE001.12
2	Describe the operating point of transistor.	Remember	CAEE001.12
3	Draw the symbols of NPN and PNP transistor.	Remember	CAEE001.12
4	Explain the operation of BJT and its types.	Understand	CAEE001.12
5	Explain the breakdown in transistor.	Understand	CAEE001.12
6	Define transistor current.	Remember	CAEE001.12
7	Describe how a transistor acts as a switch.	Remember	CAEE001.12
8	Define saturation region.	Remember	CAEE001.12
9	Define active region.	Remember	CAEE001.12
10	Write the relation between I_C, β, I_B and I_{CBO} in a BJT.	Understand	CAEE001.12
11	Define amplifier.	Remember	CAEE001.12
12	Define Biasing.	Remember	CAEE001.12
13	Define current amplification factor.	Remember	CAEE001.12
14	Explain about the various regions in a transistor.	Understand	CAEE001.12
15	Draw and explain the ac load line.	Understand	CAEE001.12
16	Discuss why biasing is necessary in BJT amplifiers.	Understand	CAEE001.12
17	Define cutoff region in transistor characteristics.	Remember	CAEE001.12
18	Write a short note on transistor construction.	Understand	CAEE001.12
19	Design a circuit and explain the working of a transistor as a switch.	Understand	CAEE001.12
20	Explain the concept of DC load line with the help of neat diagram.	Understand	CAEE001.12
Part - B (Long Answer Questions)			
1	Explain the operation of NPN and PNP transistor.	Understand	CAEE001.12
2	Illustrate with a diagram, how the BJT transistor acts as an amplifier.	Remember	CAEE001.12
3	Explain the working of a transistor as an amplifier.	Understand	CAEE001.12
4	Explain the term α and β current gains and their relationship for N-P-N transistor.	Understand	CAEE001.12
5	Draw the input and output characteristics of a transistor in common emitter configurations.	Remember	CAEE001.12
6	Explain the constructional details of Bipolar Junction Transistor.	Understand	CAEE001.12

7	Describe the significance of the terms, α and β. Establish a relation between them.	Remember	CAEE001.12
8	Derive the relation among α, β and γ in CE configuration.	Remember	CAEE001.14
9	Determine the significance of operating point, DC and AC load lines to ensure active region operation of a BJT in CE amplifier.	Remember	CAEE001.14
10	Explain the concept of ac and dc load line with the help of neat diagram.	Understand	CAEE001.14
11	Draw the common emitter circuit and sketch the input and output characteristics Also explain active region, cut off region and saturation region by indicating them on the characteristic curve.	Remember	CAEE001.14
12	Give the relationship between α, β and γ of a transistor in CC configuration.	Understand	CAEE001.14
13	Explain the input and output characteristics of a transistor in CB configuration.	Understand	CAEE001.14
14	Explain the input and output characteristics of a transistor in CE configuration.	Understand	CAEE001.14
15	Explain the input and output characteristics of a transistor in CC configuration.	Understand	CAEE001.14
Part - C (Problem Solving and Critical Thinking Questions)			
1	Calculate the values of I_C and I_E for a transistor with α_{dc} = 0.99 and I_{CBO} =5μA, if I_B is measured as 20μA?	Understand	CAEE001.14
2	Determine the collector current and emitter current for a transistor with α = 0.99 and I_{CBO}= 490μA when the base current is 19μA	Remember	CAEE001.14
3	The reverse leakage current of the transistor when connected in CB configuration is 0.2μA while it is 18μA when the same transistor is connected in CE configuration. Calculate α and β of the transistor?	Understand	CAEE001.14
4	If the base current in a transistor is 20μA when the emitter current is 6.4mA, what are the values of α_{dc} and β_{dc}? Also determine the collector current.	Remember	CAEE001.14
5	In a certain transistor, the emitter current is 1.02 times as large as the collector current. If the emitter current is 12 mA, Calculate the base current.	Understand	CAEE001.14
6	A) Calculate α_{dc}, For each of the following values of β_{dc}=50 and 190. B) Calculate β_{dc} for each of the following values of α_{dc}=0.995 and 0.9765.	Understand	CAEE001.14
7	In a certain transistor, the emitter current is 1.09 times as large as the collector current. If the emitter current is 10 mA, Calculate the base current.	Understand	CAEE001.14
8	In a Common Emitter transistor circuit if β = 100 and IB = 50μA, compute the values of α, I_E and I_C.	Remember	CAEE001.14
9	Find the value of β if α = 0.9.(where α and β are current amplification factor in Common Emitter configuration.	Understand	CAEE001.14
10	Derive the relationship between α and β. Calculate the value of Ic, Ie for a transistor that has = 0.98 and Ib = 100μA.	Remember	CAEE001.14
11	Explain Input and output characteristics. Derive α = β / β+1.Draw the circuit of CE configuration of transistor.	Understand	CAEE001.14
12	Determine the collector current and emitter current for a transistor with α = 0.98 and I_{CBO}= 640 μA when the base current is 25Ma.	Remember	CAEE001.14
13	Calculate the values of I_C and I_E for a transistor with α_{dc} = 0.99 and I_{CBO} =2.5μA, if I_B is measured as 25 μA.	Understand	CAEE001.14
14	If the base current in a transistor is 40μA when the emitter current is 3.5 mA, what are the values of α_{dc} and β_{dc}? Also determine the collector current.	Remember	CAEE001.14

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